yli130_Assignment 2

1. (a)

Xi: the number of the full-time workers (i=1,2,3)

Yi: the number of the part-time workers(i=1,2,3,4)

Objective Function:

Pay(min) = 112*X1 + 112*X2 +112*X3 + 48*Y1 + 48*Y2 + 48*Y3 + 48*Y4

S.T:

$X1 + Y1 \geq 4$

$X1 + X2 + Y2 \geq 8$

$X2 + X3 + Y3 \geq 10$

$X3 + Y4 \geq 6$

$X1 \geq Y1$

$X1 + X2 \geq Y2$

$X2 + X3 \geq Y3$

$X3 \geq Y4$

Solution:

$2X1 + 2X2 + 2X3 + Y1 + Y2 + Y3 + Y4 \geq 28$

$2X1 + 2X2 + 2X3 - Y1 - Y2 - Y3 - Y4 \geq 0$

$4X1 + 4X2 + 4X3 \geq 28$

$X1 + X2 + X3 \geq 7$ means at least need 7 full time workers

And $Y1 + Y2 + Y3 + Y4 \geq 14$ at least 14 part time workers

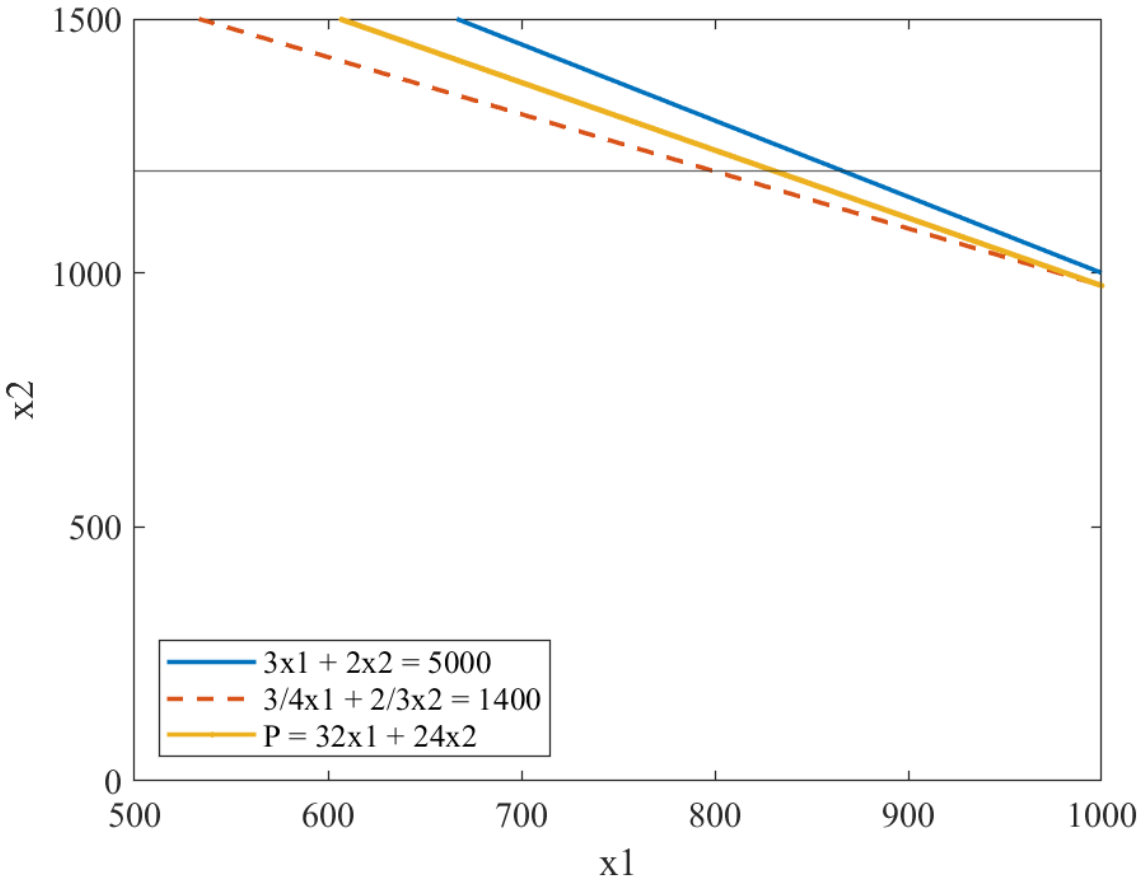
Pay (min) = 112*7 + 48*14 = 784 + 672 = 1456

(b)

Full time worker lunch for 1 hour

Pay(min) = 98*7 + 48*14 = 686 + 672 = 1358

2.



I draw this picture with Matlab.

And found the maximum profit is the right border point, X1 = 1000, X2 = 975.

So, the number of Collegiates production per week is 1000, for Minis is 975.

3.

(a)

There are 9 decision variables

Li: the number of large sizes produced by each plant, i=1,2,3

Mi: the number of medium sizes produced by each plant, i=1,2,3

Si: the number of small sizes produced by each plant, i=1,2,3

(b)

Objective Function:

$$P(\text{profit}) = 420*L1 + 420*L2 + 420*L3 + 360*M1 + 360*M2 + 360*M3 + 300*S1 + 300*S2 + 300*S3$$

S.T.:

$L1 + M1 + S1 \leq 750$

$L2 + M2 + S2 \leq 900$

$L3 + M3 + S3 \leq 450$

$20L1 + 15M1 + 12S1 \leq 13000$

$20L2 + 15M2 + 12S2 \leq 12000$

$20L3 + 15M3 + 12S3 \leq 5000$

$L1 + L1 + L3 \leq 900$

$M1 + M2 + M3 \leq 1200$

$S1 + S2 + S3 \leq 750$

$Li, Mi, Si \geq 0$

According to RMD, the maximum profit is 707940, and each plant & sizes production is shown in the other RMD knitted pdf file.